Table of Contents


```
% This script generates the posterior samples for the model
%
% $$ \alpha_t \sim N(0,1); t=1,2,...T $$
%
% $$ y_t \sim N(\alpha_t,\exp(\theta)) $$
%
```

Creating simulated data

```
clc; close all
T       = 100;                  % data points
alpha   = randn(1,T);
y       = alpha + randn(1,T);
```

Setting up initial samples

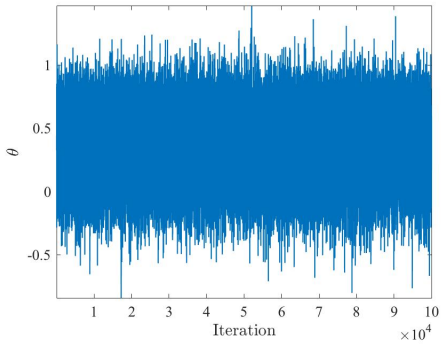
```
theta   = 0;    % first parameter
alpha_T = y./2; % mean value of the Kalman filter output
```

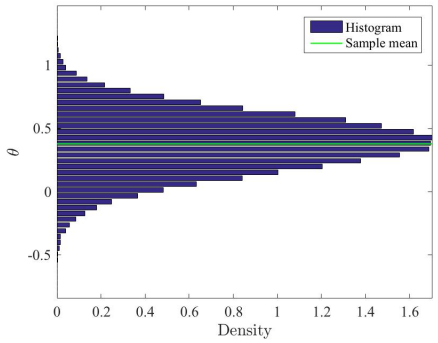
Sampling θ using Hamiltonian Monte Carlo

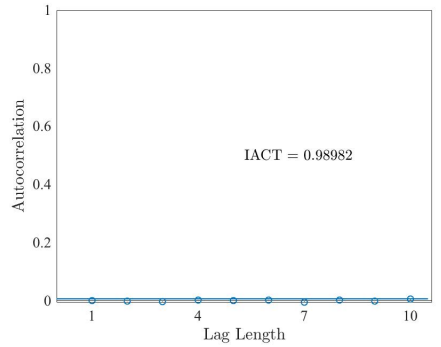
```
tic
launch_stan
time_stan = toc
```

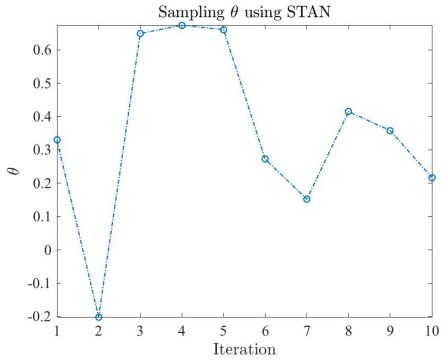
```
Stan succeeded.
```

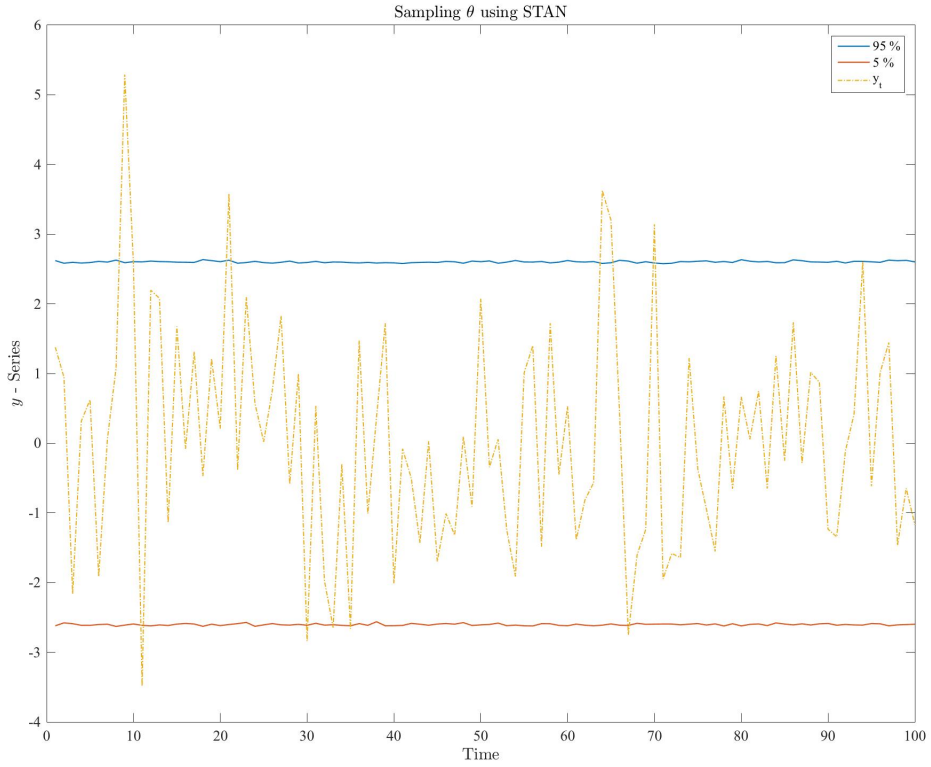
```
time_stan =

   36.0408
```


θ
Iteration
×10^4


Histogram
Sample mean
θ
Density


Autocorrelation
IACT = 0.98982
Lag Length


Sampling θ using STAN
θ
Iteration

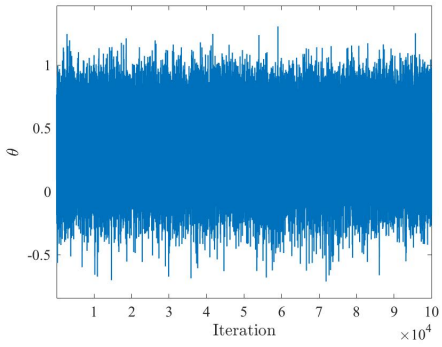


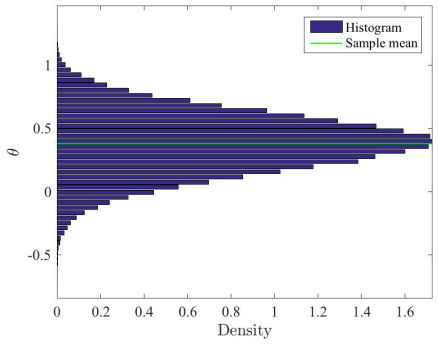
Sampling (θ, α_t) using Hamiltonian Monte Carlo

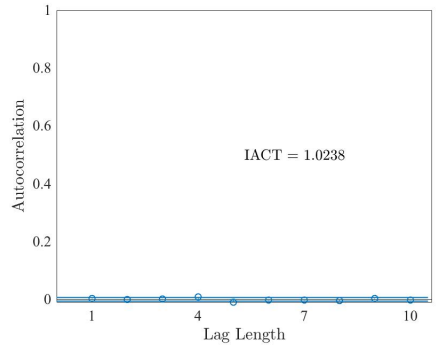
```
tic
launch_stan_full
time_stan_full = toc
```

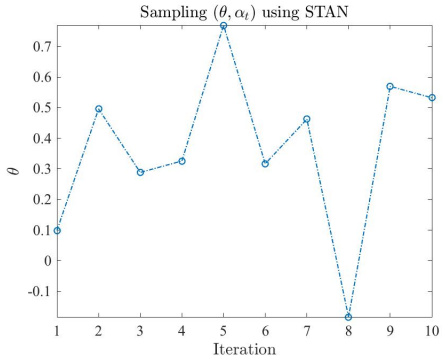
```
Stan succeeded.
```

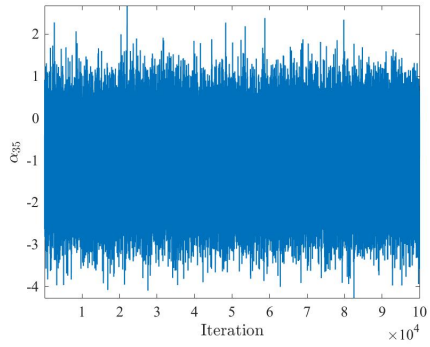
```
time_stan_full =

   36.7566
```

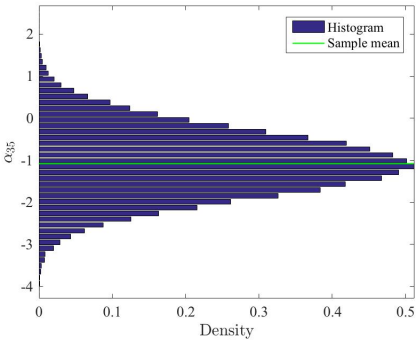

θ
Iteration
×10^4

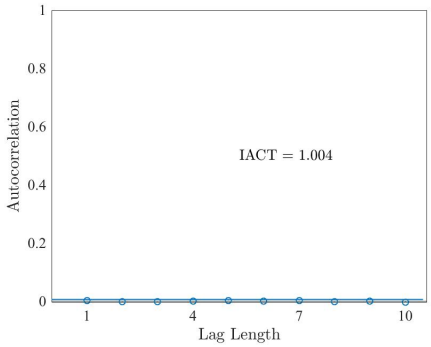

Histogram
Sample mean
θ
Density

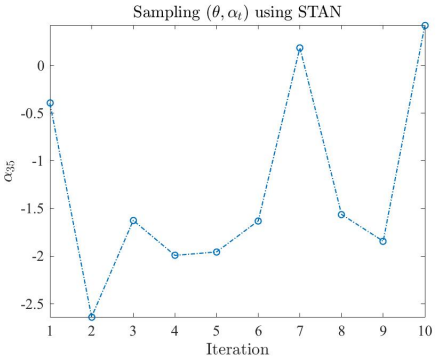

Autocorrelation
IACT = 1.0238
Lag Length

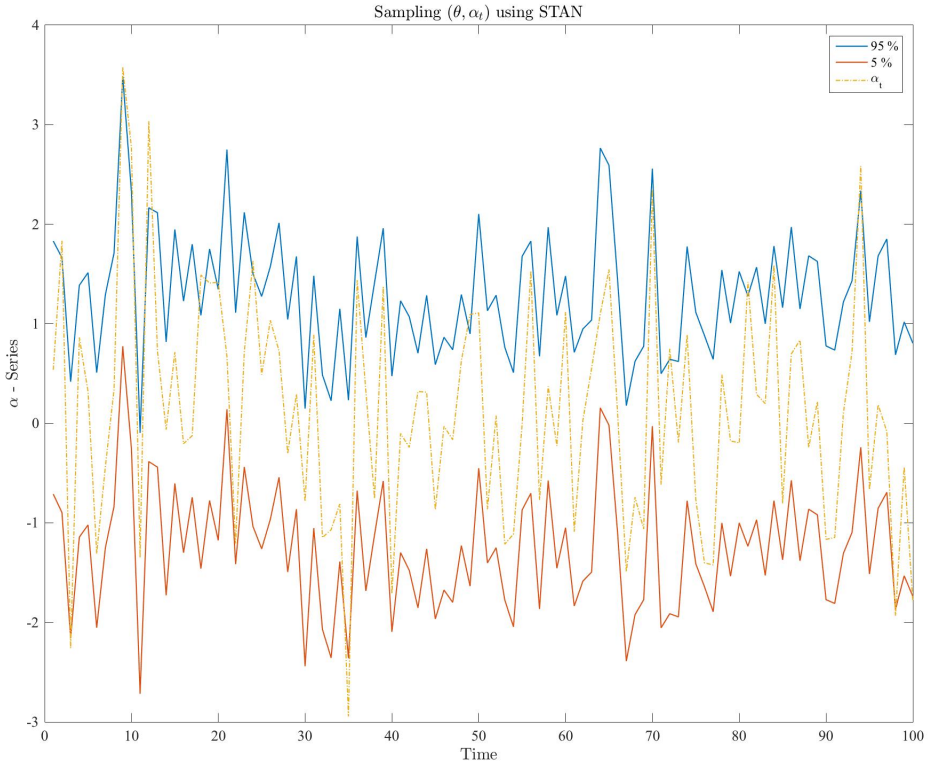

Sampling (θ, α_ℓ) using STAN
θ
Iteration

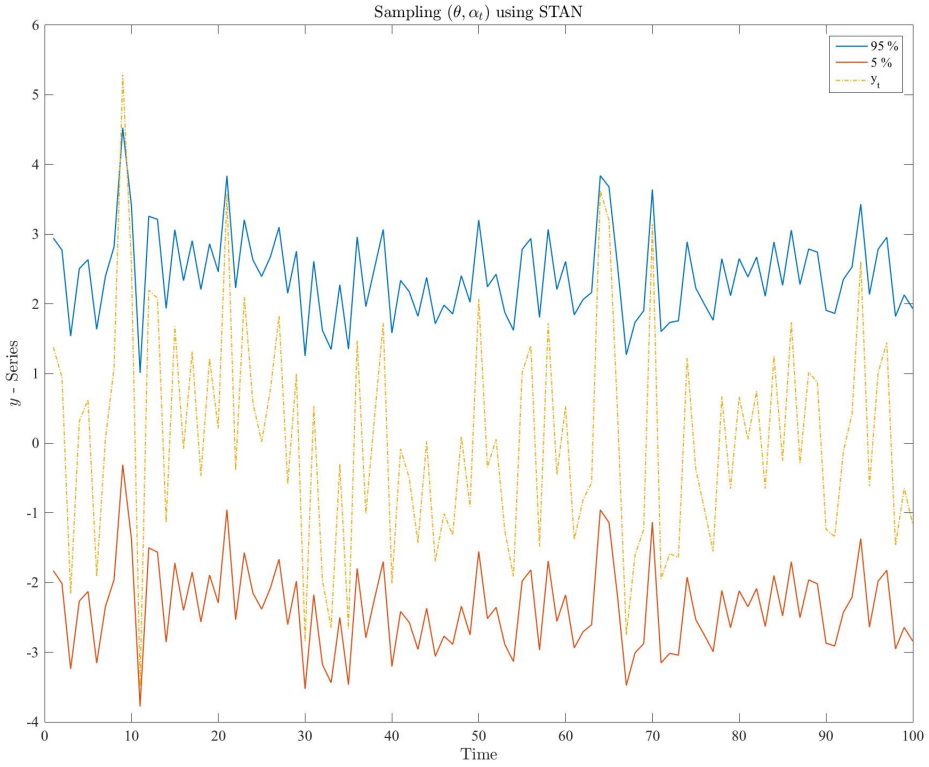

α_{35}
Iteration
$\times 10^4$


Histogram
Sample mean
α_{35}
Density


Autocorrelation
IACT = 1.004
Lag Length


Sampling (θ, α_ℓ) using STAN
α_{35}
Iteration

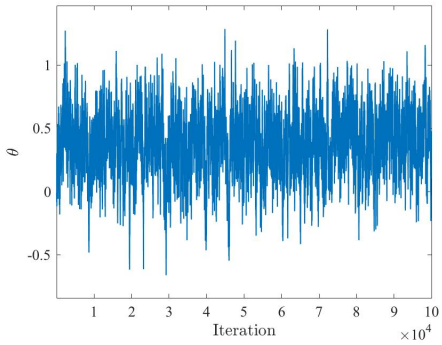

Sampling (θ, α_t) using STAN
95 %
5 %
α_t
α - Series
Time
4
3
2
1
0
-1
-2
-3
0
10
20
30
40
50
60
70
80
90
100

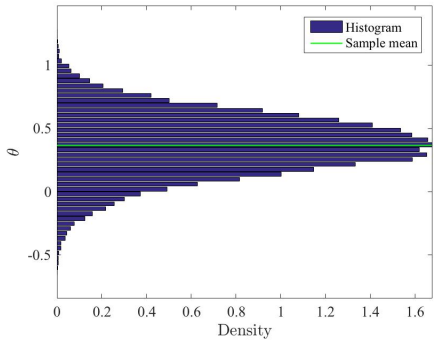


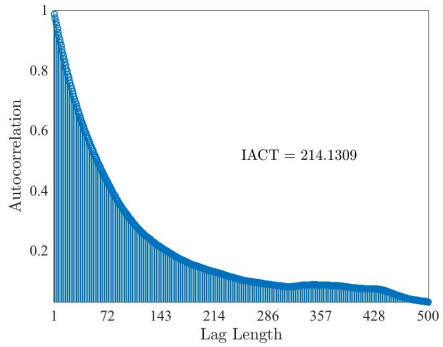
Sampling (θ, α_t) using T-factors Auxiliary Gibbs sampler

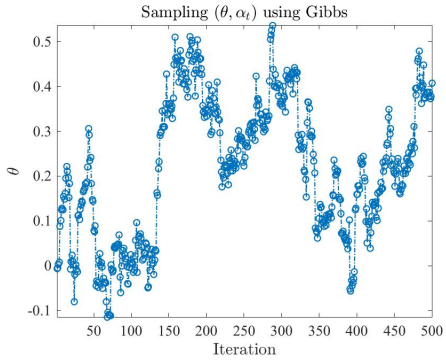
```
tic
T_factors_Gibbs
time_Gibbs = toc
```

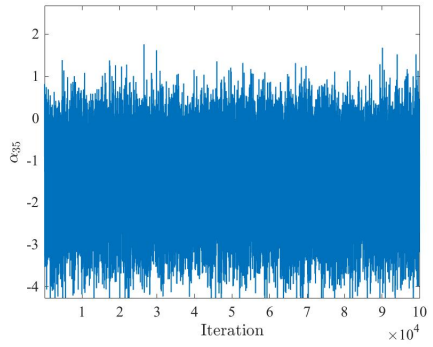
```
time_Gibbs =

  159.8191
```

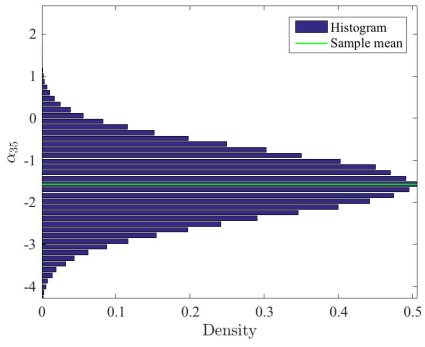

θ
Iteration
×10^4

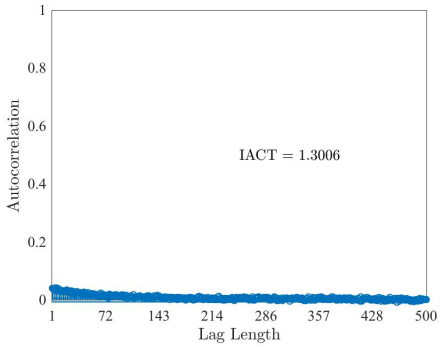

Histogram
Sample mean
θ
Density

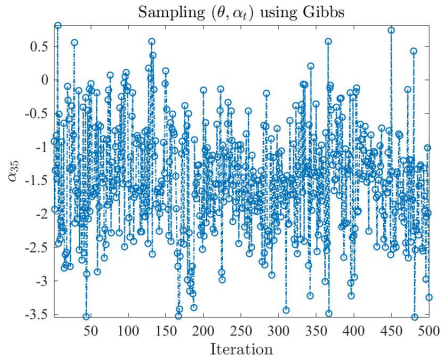

Autocorrelation
IACT = 214.1309
Lag Length

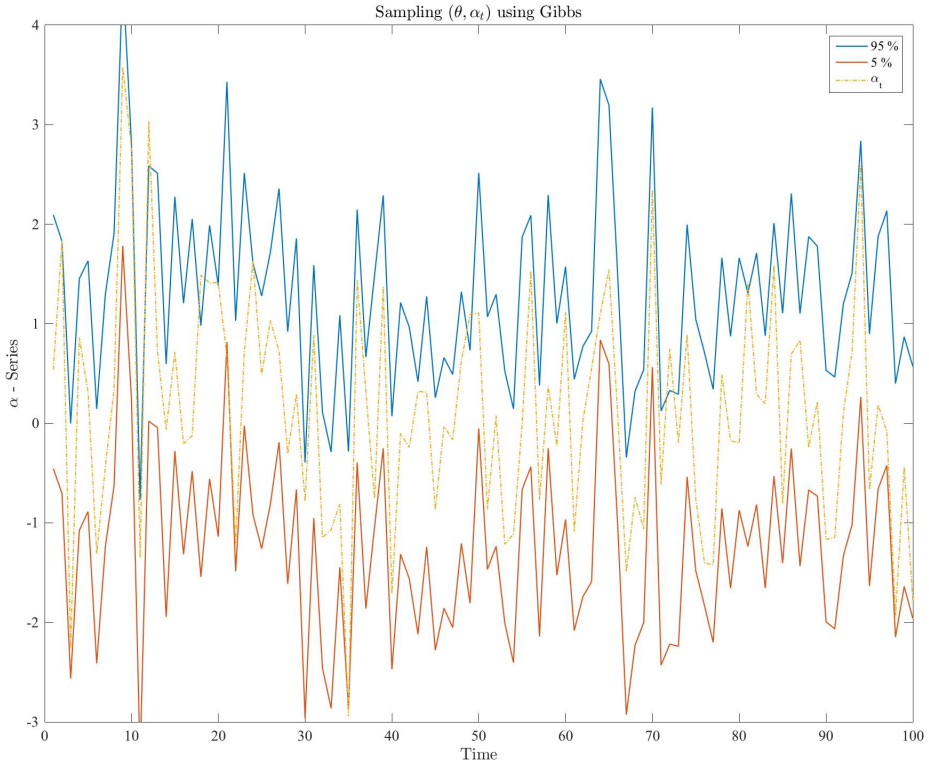

Sampling (θ, α_l) using Gibbs
θ
Iteration

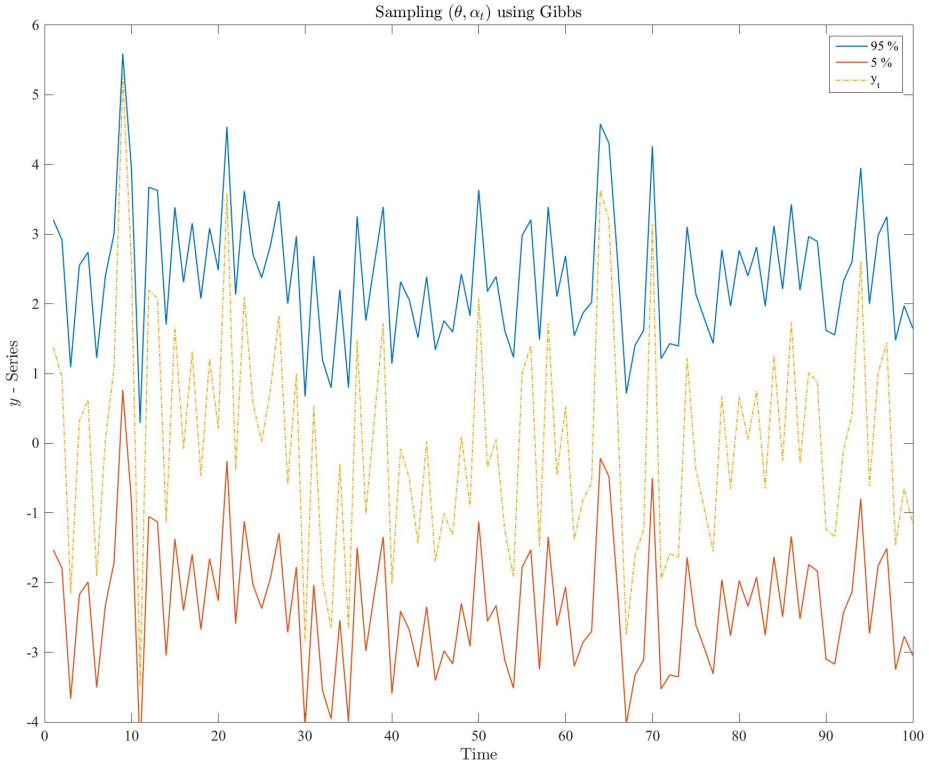

α_{35}
Iteration
$\times 10^4$


Histogram
Sample mean
α_{35}
Density


IACT = 1.3006
Autocorrelation
Lag Length


Sampling (θ, α_l) using Gibbs
α_{35}
Iteration

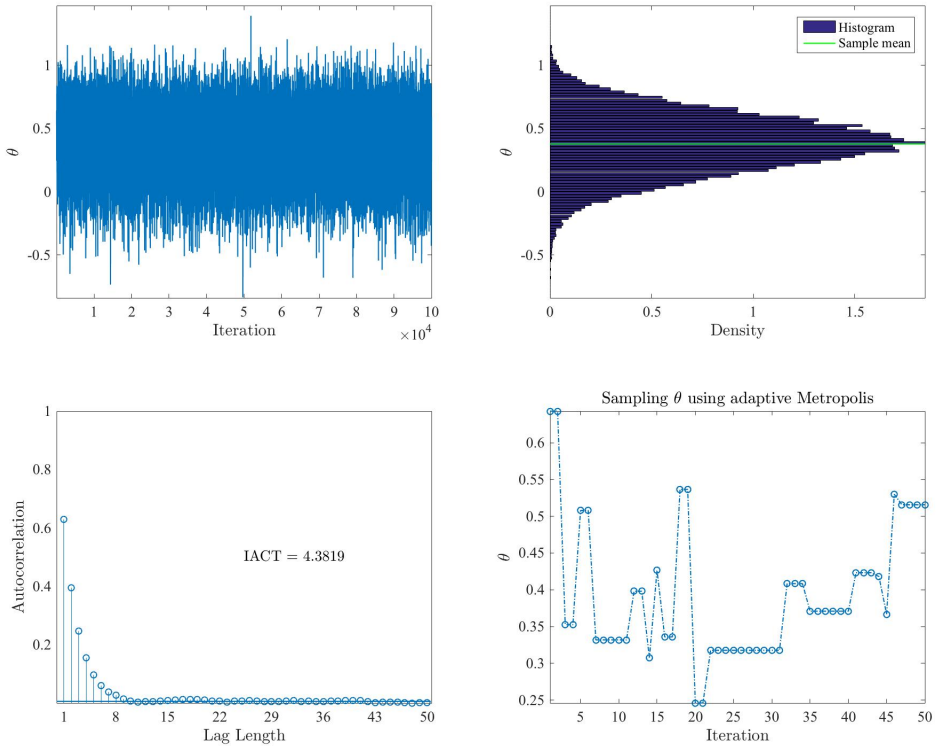

Sampling (θ, α_t) using Gibbs
95 %
5 %
α_t
α - Series
Time
4
3
2
1
0
-1
-2
-3
0
10
20
30
40
50
60
70
80
90
100



Sampling θ using adaptive Metropolis sampler

```
tic
launch_am
time_am = toc
```

```
time_am =

    7.9208
```



Cleaning up working folder

```
delete *.stan *.hpp *.mat *.csv *.R
```

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